We claim:

1. A DNA sequence encoding at least a portion of at least one β-chain antigen of the HLA-DR locus of the human lymphocyte antigen complex, said sequence being selected from the group consisting of

(a) the DNA inserts DR-β-A, DR-β-B and DR-β-C,

(b) DNA sequences which hybridize under high criterium thereto, and

(c) DNA sequences which when expressed code for the polypeptides coded for by the expression of any of the foregoing DNA sequences or inserts,

said sequences and inserts encoding a product that displays an immunological or biological activity of a β-chain of the HLA-DR locus.

2. The DNA sequence of claim 1, wherein said sequence (b) which hybridizes to said sequence (a) is selected from the group consisting of:

(d) the DNA insert of DR-β-D,

(e) DNA sequences which hybridize under high criterium thereto;

(f) DNA sequences which when expressed code for the polypeptides coded for by the expression of any of the foregoing DNA sequences or inserts,

said sequences and inserts encoding a product that displays an immunological or biological activity of a β-chain of the HLA-DR locus.

3. A DNA sequence selected from the group consisting of:

ATGGTGTGTCTGAAGCTCCCTGGAGGCTCCAGCTTGGCAGCGTTGACAGTG
ACACTGATGGTGCTGAGCTCCCGACTGGCTTTCGCTGGGGACACCCGACCA
CGTTTCTTGGAGCTGCTTAAGTCTGAGTGTCATTTCTTCAATGGGACGGAG

CGGGTGCGGTTCCTGGAGAGACACTTCCATAACCAGGAGGAGTACGCGCGCT
TCGACAGCGACGTGGGGGAGTACCGGGCGGTGAGGGAGCTGGGGCGGCCTGA
TGCCGAGTACTGGAACAGCCAGAAGGACCTCCTGGAGCAGAAGCGGGGCCAG
GTGGACAATTACTGCAGACACAACTACGGGGTTGTGGAGAGCTTCACAGTGC
AGCGGCGAGTCCATCCTCAGGTGACTGTGTATCCTGCAAAGACCCAGCCCCT
GCAGCACCACAACCTCCTGGTCTGCTCTGTGAGTGGTTTCTATCCAGGCAGC
ATTGAAGTCAGGTGGTTCCGGAACGGCCAGGAAGAGAAGGCTGGGGTGGTGT
CCACGGGCCTGATCCAGAATGGAGACTGGACCTTCCAGACCCTGGTGATGCT
AGAAACATTTCCTCGGAGTGGAGAGGTTTACACCTGCCAAGTGGAGCACCCA
AGCGTAACGAGCCCTCTCACAGTGGAATGGAGTGCACGGTCTGAATCTGCAC
AGAGCAAGATGCTGAGTGGAGTCGGGGGCTTTGTGCTGGGCCTGCTCTTCCT
TGGGGCCGGGCTGTTCATCTACTTCAGGAATCAGAAAGGACACTCTGGACTT
CAGCCAACAGGATTCCTGAGC and GGGGACACCCGACCACGTTTCTTG
GAGCTGCTTAAGTCTGAGTGTCATTTCTTCAATGGGACGGAGCGGGTGCGGT
TCCTGGAGAGACACTTCCATAACCAGGAGGAGTACGCGCGCTTCGACAGCGA
CGTGGGGGAGTACCGGGCGGTGAGGGAGCTGGGGCGGCCTGATGCCGAGTAC
TGGAACAGCCAGAAGGACCTCCTGGAGCAGAAGCGGGGCCAGGTGGACAATT
ACTGCAGACACAACTACGGGGTTGTGGAGAGCTTCACAGTGCAGCGGCGAGT
CCATCCTCAGGTGACTGTGTATCCTGCAAAGACCCAGCCCCTGCAGCACCAC
AACCTCCTGGTCTGCTCTGTGAGTGGTTTCTATCCAGGCAGCATTGAAGTCA
GGTGGTTCCGGAACGGCCAGGAAGAGAAGGCTGGGGTGGTGTCCACGGGCCT
GATCCAGAATGGAGACTGGACCTTCCAGACCCTGGTGATGCTAGAAACATTT
CCTCGGAGTGGAGAGGTTTACACCTGCCAAGTGGAGCACCCAAGCGTAACGA
GCCCTCTCACAGTGGAATGGAGTGCACGGTCTGAATCTGCACAGAGCAAGAT
GCTGAGTGGAGTCGGGGGCTTTGTGCTGGGCCTGCTCTTCCTTGGGGCCGGG
CTGTTCATCTACTTCAGGAATCAGAAAGGACACTCTGGACTTCAGCCAACAG
GATTCCTGAGC.

4. A DNA sequence selected from the group consisting of: TGGAGCTGCTTAAGTCTGA, TCCTGGAGAGACAC TTCCA, GGGGCCAGGTGGACAATTA, and GCTTCGACAGCGACGTGGG.

5. A DNA sequence selected from the group consisting of:

ATGGTGTGTCTGAAGTTCCCTGGAGGCTCCTGCATGGCAGCTCTGACAGTG
ACACTGATGGTGCTGAGCTCCCCACTGGCTTTGGCTGGGGACACCCGACCA
CGTTTCTTGGAGCAGGTTAAACATGAGTGTCATTTCTTCAACGGGACGGAG
CGGGTGCGGTTCCTGGACAGATACTTCTATCACCAAGAGGAGTACGTGCGC

TTCGACAGCGACGTGGGGGAGTACCGGGCGGTGACGGAGCTGGGGCGGCCT
GATGCCGAGTACTGGAACAGCCAGAAGGACCTCCTGGAGCAGAAGCGGGCC
GCGGTGGACACCTACTGCAGACACAACTACGGGGTTGGTGAGAGCTTCACA
GTGCAGCGGCGAGTCTATCCTGAGGTGACTGTGTATCCTGCAAAGACCCAG
CCCCTGCAGCACCACAACCTCCTGGTCTGCTCTGTGAATGGTTTCTATCCA
GGCAGCATTGAAGTCAGGTGGTTCCGGAACGGCCAGGAAGAGAAGACTGGG
GTGGTGTCCACAGGCCTGATCCAGAATGGAGACTGGACCTTCCAGACCCTG
GTGATGCTGGAAACAGTTCCTCGGAGTGGAGAGGTTTACACCTGCCAAGTG
GAGCACCCAAGCCTGACGAGCCCTCTCACAGTGGAATGGAGAGCACGGTCT
GAATCTGCACAGAGCAAGATGCTGAGTGGAGTCGGGGGCTTCGTGCTGGGC
CTGCTCTTCCTTGGGGCCGGGCTGTTCATCTACTTCAGGAATCAGAAAGGA
CACTCTGGACTTCAGCCAACAGGATTCCTGAGC and GGGGACACCCGA
CCACGTTTCTTGGAGCAGGTTAAACATGAGTGTCATTTCTTCAACGGGACG
GAGCGGGTGCGGTTCCTGGACAGATACTTCTATCACCAAGAGGAGTACGTG
CGCTTCGACAGCGACGTGGGGGAGTACCGGGCGGTGACGGAGCTGGGGCGG
CCTGATGCCGAGTACTGGAACAGCCAGAAGGACCTCCTGGAGCAGAAGCGG
GCCGCGGTGGACACCTACTGCAGACACAACTACGGGGTTGGTGAGAGCTTC
ACAGTGCAGCGGCGAGTCTATCCTGAGGTGACTGTGTATCCTGCAAAGACC
CAGCCCCTGCAGCACCACAACCTCCTGGTCTGCTCTGTGAATGGTTTCTAT
CCAGGCAGCATTGAAGTCAGGTGGTTCCGGAACGGCCAGGAAGAGAAGACT
GGGGTGGTGTCCACAGGCCTGATCCAGAATGGAGACTGGACCTTCCAGACC
CTGGTGATGCTGGAAACAGTTCCTCGGAGTGGAGAGGTTTACACCTGCCAA
GTGGAGCACCCAAGCCTGACGAGCCCTCTCACAGTGGAATGGAGAGCACGG
TCTGAATCTGCACAGAGCAAGATGCTGAGTGGAGTCGGGGGCTTCGTGCTG
GGCCTGCTCTTCCTTGGGGCCGGGCTGTTCATCTACTTCAGGAATCAGAAA
GGACACTCTGGACTTCAGCCAACAGGATTCCTGAGC.

6. A DNA sequence selected from the group consisting of TGGAGCAGGTTAAACATGA, TCCTGGACAGATACTTC TA, and GGGCCGCGGTGGACACCTA.

7. A DNA sequence selected from the group consisting of DNA insert DR-β-C, the expressed portion of the DNA insert of DR-β-C, and fragments of either member of this group that encode products displaying an immunological or biological activity of a β-chain of the HLA-DR locus.

8. A DNA sequence selected from the group consisting of DNA insert DR-β-D, the expressed por-

tion of the DNA insert of DR-β-D, and fragments of either member of this group that encode products displaying an immunological or biological activity of a β-chain of the HLA-DR locus.

9. A recombinant DNA molecule comprising a DNA sequence selected from the DNA sequences of any one of claims 1-3, 5 and 7-8.

10. The recombinant DNA molecule of claim 9 wherein the DNA sequence is operatively linked to an expression control sequence in said recombinant DNA molecule.

11. A polypeptide displaying an immunological or biological activity of at least one β-chain antigen of the HLA-DR locus of the human lymphocyte antigen complex produced by a process of culturing a host transformed with the recombinant DNA molecule of claim 10.

12. A polypeptide selected from the group consisting of polypeptides of the formula:
MVCLKLPGGSSLAALTVTLMVLSSRLAFAGDTRPRFLELLKSECHFFNGTE
RVRFLERHFHNQEEYARFDSDVGEYRAVRELGRPDAEYWNSQKDLLEQKRG
QVDNYCRHNYGVVESFTVQRRVHPQVTVYPAKTQPLQHHNLLVCSVSGFYP
GSIEVRWFRNGQEEKAGVVSTGLIQNGDWTFQTLVMLETFPRSGEVYTCQV
EHPSVTSPLTVEWSARSESAQSKMLSGVGGFVLGLLFLGAGLFIYFRNQKG
HSGLQPTGFLS and GDTRPRFLELLKSECHFFNGTERVRFLERHFHNQE
EYARFDSDVGEYRAVRELGRPDAEYWNSQKDLLEQKRGQVDNYCRHNYGVV
ESFTVQRRVHPQVTVYPAKTQPLQHHNLLVCSVSGFYPGSIEVRWFRNGQE
EKAGVVSTGLIQNGDWTFQTLVMLETFPRSGEVYTCQVEHPSVTSPLTVEW
SARSESAQSKMLSGVGGFVLGLLFLGAGLFIYFRNQKGHSGLQPTGFLS.

13. A polypeptide selected from the group consisting of polypeptides of the formula:
MVCLKFPGGSCMAALTVTLMVLSSPLALAGDTRPRFLEQVKHECHFFNGTE
RVRFLDRYFYHQEEYVRFDSDVGEYRAVTELGRPDAEYWNSQKDLLEQKRA
AVDTYCRHNYGVGESFTVQRRVYPEVTVYPAKTQPLQHHNLLVCSVNGFYP
GSIEVRWFRNGQEEKTGVVSTGLIQNGDWTFQTLVMLETVPRSGEVYTCQV
EHPSLTSPLTVEWRARSESAQSKMLSGVGGFVLGLLFLGAGLFIYFRNQKG
HSGLQPTGFLS and GDTRPRFLEQVKHECHFFNGTERVRFLDRYFYHQE

EYVRFDSDVGEYRAVTELGRPDAEYWNSQKDLLEQKRAAVDTYCRHNYGVG
ESFTVQRRVYPEVTVYPAKTQPLQHHNLLVCSVNGFYPGSIEVRWFRNGQE
EKTGVVSTGLIQNGDWTFQTLVMLETVPRSGEVYTCQVEHPSLTSPLTVEW
RARSESAQSKMLSGVGGFVLGLLFLGAGLFIYFRNQKGHSGLQPTGFLS.

14. A process for producing a DNA sequence encoding at least one β-chain antigen of the HLA-DR locus of the human lymphocyte antigen complex comprising the steps of culturing a host transformed with a recombinant DNA molecule of claim 9, and isolating said DNA sequence.

15. A process for producing a polypeptide displaying an immunological or biological activity of at least one β-chain antigen of the HLA-DR locus of the human lymphocyte antigen complex comprising the steps of culturing a host transformed with a recombinant DNA molecule of claim 10 and collecting the polypeptide.

16. An HLA-DR typing process comprising the steps of restricting DNA isolated from the individual to be typed with at least one restriction endonuclease; size fractionating the restricted DNA; hybridizing the size-fractionated DNA to a DNA sequence of any one of claims 1 to 8 and detecting the areas of hybridization.

17. The process of claim 16, wherein a ^{32}P-labelled DNA sequence is employed for hybridization and its radioactive label is used for detecting the areas of hybridization.

18. An HLA-DR typing process comprising the steps of restricting DNA isolated from the individual to be typed with at least one restriction endonuclease; size fractionating the restricted DNA; hybridizing the sizefractionated DNA to a 19-mer selected from the group consisting of TGGAGCTGCTTAAG TCTGA, TCCTGGAGAGACACTTCCA, GGGGCCAGGTGGACAATTA, TGGAGCAGGTTAAACATGA, TCCTGGACAGATACTTCTA, and GGGCCG CGGTGGACACCTA.

19. The typing process of claim 18 wherein the hybridization control is a 19-mer of the formula GCTTCGACAGCGACGTGGG.

20. An HLA-DR typing kit characterized by a DNA sequence of any one of claims 1 to 8.

21. In an HLA-DR typing process, the improvement comprising employing a polypeptide of claim 11-13 or an antibody raised against those polypeptides.

22. In an HLA-DR typing kit, the improvement comprising employing a polypeptide of claim 11-13 or an antibody raised against those polypeptides.